COPY

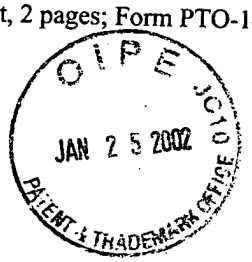
Serial No:	**09/905,529**	Filing Date:	**July 13, 2001**
In Re:	**Feng Qian**	Examiner:	Not Yet Assigned
Our Reference:	**LSI-003-PAP**	Group Art Unit:	**2661**

Entitled: **FRAME MATCHING METHOD AND APPARATUS FOR USE IN A COMMUNICATION SYSTEM**

Today's Date: **December 14, 2001**

The Patent Offices' stamp hereon acknowledges receipt of the following:

Paper: Information Disclosure Statement, 2 pages; Form PTO-1449, 1 page; Four (4) cited references; return postcard.



COPY

LSI-003-PAP
LSI Ref: 00-414

PATENT

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Applicant	:	**Feng Qian**
App. No.	:	**09/905,529**
Filed	:	**July 13, 2001**
For	:	**FRAME MATCHING METHOD AND APPARATUS FOR USE IN A COMMUNICATION SYSTEM**
Group Art:		**2661**
Examiner:		Unknown

I hereby certify that this correspondence and all marked attachments are being deposited with the United States Postal Service with sufficient postage as first-class mail in an envelope addressed to: Assistant Commissioner for Patents, Washington, D.C. 20231,

On: **December 14, 2001**

Barbara Kelly

Barbara S. Kelly

INFORMATION DISCLOSURE STATEMENT

Assistant Commissioner for Patents
Washington, DC 20231

Pursuant to 37 C.F.R. §1.56 and in accordance with 37 C.F.R. §§1.97-1.98, information relating to the above-identified application is hereby disclosed. Inclusion of information in this statement is not to be construed as an admission that this information is material as that term is defined in 37 C.F.R. §1.56(b).

(X) In accordance with §1.97(b), since this Information Disclosure Statement is being filed either within three months of the filing date of the of the above-identified application, within three months of the date of entry into the national stage of the above identified application as set forth in §1.491, or before the mailing date of a first Office Action on the merits of the above-identified application, no additional fee is required.

(XX) Copies of each of the references listed on the attached modified Form PTO-1449 are enclosed herewith.

All of the listed references are in the English language.

Respectfully submitted,

Date: December 14, 2001

Signature **Allan Y. Lee**
Registration No. **43,744**

JAQUEZ & ASSOCIATES
750 B Street, Suite 2640
San Diego, CA 92101
(619) 238-1814 (voice)
(619) 238-2426 (fax)
E-mail: jaquez@san.rr.com

FORM PTO-1449 U.S. DEPARTMENT OF COMMERCE PATENT AND TRADEMARK OFFICE	ATTY. DOCKET NO. LSI-003-PAP	APPLICATION NO. 09/905,529
INFORMATION DISCLOSURE STATEMENT BY APPLICANT (USE SEVERAL SHEETS IF NECESSARY)	APPLICANT Feng Qian	
	FILING DATE July 13, 2001	GROUP 2661

COPY

U.S. PATENT DOCUMENTS

EXAMINER INITIAL		DOCUMENT NUMBER	DATE	NAME	CLASS	SUBCLASS	FILING DATE (IF APPROPRIATE)
	1	09/687,700		Feng Qian			October 12, 2000
	2	09/686,786		Feng Qian			October 10, 2000

EXAMINER INITIAL		OTHER DOCUMENTS (INCLUDING AUTHOR, TITLE, DATE, PERTINENT PAGES, ETC.)
	3	"Physical Layer Standard for cdma2000 Standards for Spread Spectrum Systems", Telecommunications Industry Association/Electronic Industries Alliance Interim Standard, TIA/EIA/IS-2000.2-A, published March 2000, pages 2-105 to 2-107 and 3-91 to 3-92.
	4	"Physical Layer Standard for cdma2000 Standards for Spread Spectrum Systems", Telecommunications Industry Association/Electronic Industries Alliance Interim Standard, Addendum 1, TIA/EIA/IS-2000.2-A-1, published November 2000, pages 2-115 to 2-117 and 3-96 to 3-98.

EXAMINER	DATE CONSIDERED

*EXAMINER: INITIAL IF CITATION CONSIDERED, WHETHER OR NOT CITATION IS IN CONFORMANCE WITH MPEP 609; DRAW LINE THROUGH CITATION IF NOT IN CONFORMANCE AND NOT CONSIDERED, INCLUDE COPY OF THIS FORM WITH NEXT COMMUNICATION TO APPLICANT.

TIA/EIA INTERIM STANDARD

Physical Layer Standard for cdma2000 Spread Spectrum Systems

Addendum 1

TIA/EIA/IS-2000.2-A-1

(Addendum No. 1 to TIA/EIA/IS-2000.2-A)

NOVEMBER 2000

TELECOMMUNICATIONS INDUSTRY ASSOCIATION

The Telecommunications Industry Association represents the communications sector of

Electronic Industries Alliance

Table 2.1.3.1.5-1. Code Symbol Repetition

Channel Type		Number of Repeated Code Symbols/Code Symbol
Access Channel (Spreading Rate 1 only)		2
Enhanced Access Channel		4 (9600 bps) 2 (19200 bps) 1 (38400 bps)
Reverse Common Control Channel		4 (9600 bps) 2 (19200 bps) 1 (38400 bps)
Reverse Dedicated Control Channel		2
Reverse Fundamental Channel	RC 1 or 2	8 (1200 or 1800 bps) 4 (2400 or 3600 bps) 2 (4800 or 7200 bps) 1 (9600 or 14400 bps)
	RC 3, 4, 5, or 6	16 (1500 or 1800 bps) 8 (2700 or 3600 bps) 4 (4800 or 7200 bps) 2 (9600 or 14400 bps)
Reverse Supplemental Code Channel (RC 1 or 2)		1
Reverse Supplemental Channel	20 ms frames	16 (1500 or 1800 bps) 8 (2700 or 3600 bps) 4 (4800 or 7200 bps) 2 (9600 or 14400 bps) 1 (> 14400 bps)
	40 ms frames	8 (1350 or 1800 bps) 4 (2400 or 3600 bps) 2 (4800 or 7200 bps) 1 (> 7200 bps)
	80 ms frames	4 (1200 or 1800 bps) 2 (2400 or 3600 bps) 1 (> 3600 bps)

2.1.3.1.6 Puncturing

2.1.3.1.6.1 Convolutional Code Symbol Puncturing

Table 2.1.3.1.6.1-1 includes the base code rate, puncturing ratio, and puncturing patterns that shall be used for different radio configurations. Within a puncturing pattern, a '0' means that the symbol shall be deleted and '1' means that a symbol shall be passed. The most significant bit in the pattern corresponds to the first symbol in the symbol group

corresponding to the length of the puncturing pattern. The puncture pattern shall be repeated for all remaining symbols in the frame.

Table 2.1.3.1.6.1-1. Punctured Codes Used with Convolutional Codes

Base Code Rate	Puncturing Ratio	Puncturing Pattern	Associated Radio Configurations
1/4	8 of 24	'111010111011 101011101010'	4 and 6
1/4	4 of 12	'110110011011'	4
1/4	1 of 5	'11110'	3 and 5
1/4	1 of 9	'111111110'	3 and 5
1/2	2 of 18	'111011111 111111110'	6

For example, the 5-symbol puncturing pattern for Radio Configuration 3 is '11110', meaning that the first, second, third, and fourth symbols are passed, while the fifth symbol of each consecutive group of five symbols is removed.

2.1.3.1.6.2 Turbo Code Symbol Puncturing

Table 2.1.3.1.6.2-1 includes the base code rate, puncturing ratio, and puncturing patterns that shall be used for different radio configurations. Within a puncturing pattern, a '0' means that the symbol shall be deleted and a '1' means that a symbol shall be passed. The most significant bit in the pattern corresponds to the first symbol in the symbol group corresponding to the length of the puncturing pattern. The puncture pattern shall be repeated for all remaining symbols in the frame.

Table 2.1.3.1.6.2-1. Punctured Codes Used with Turbo Codes

Base Code Rate	Puncturing Ratio	Puncturing Pattern	Associated Radio Configurations
1/2	2 of 18	'111110101 111111111'	6
1/4	4 of 12	'110111011010'	4

2.1.3.1.6.3 Flexible and Variable Rate Puncturing

If variable-rate Reverse Supplemental Channel operation, flexible data rates, or both are supported, puncturing after symbol repetition is calculated as described here. However, note that the puncturing in 2.1.3.1.6.1 and 2.1.3.1.6.2 is used for the frame formats listed

in Table 2.1.3.6.2-1 for the Reverse Dedicated Control Channel, Table 2.1.3.7.2-1 for the Reverse Fundamental Channel, or Tables 2.1.3.8.2-1, 2.1.3.8.2-2, or 2.1.3.8.2-3 for the Reverse Supplemental Channel. ~~The number of symbols punctured per frame puncturing is defined by~~

~~$P = LM - N$~~

~~where L = Number of specified encoded symbols per frame at the encoder output~~

~~N = Desired channel interleaver size ($N \geq L$)~~

~~M = $\lceil N/L \rceil$ is the symbol repetition factor~~

~~If P is equal to 0, then puncturing is not required. If puncturing is necessary, every D-th repeated symbol is deleted until the required number of punctured symbols per frame, P, is achieved. That is, if the unpunctured symbols are numbered from 1 to LM, then symbols numbered D, 2D, 3D,... are deleted.~~

~~D = $\lfloor LM/P \rfloor$ for $P > 0$; otherwise, puncturing is not required~~

If the number of specified encoded symbols per frame at the encoder output is larger than the desired channel interleaver size, the following puncturing shall be applied.

The k-th output symbol from the puncturing block shall be the $\lfloor kL/N \rfloor$-th input symbol, where k = 0 to N-1,

L = Number of specified encoded symbols per frame at encoder output

N = Desired channel interleaver size (N<L).

Otherwise, puncturing after symbol repetition shall be disabled.

2.1.3.1.7 Block Interleaving

The mobile station shall interleave all repeated code symbols and subsequent puncturing, if used, on the Access Channel, the Enhanced Access Channel, the Reverse Common Control Channel, and the Reverse Traffic Channel prior to modulation and transmission.

For the Reverse Traffic Channel with Radio Configurations 1 and 2, the interleaver shall be an array with 32 rows and 18 columns (i.e., 576 cells). Repeated code symbols shall be written into the interleaver by columns from the first column to the eighteenth column filling the complete 32 × 18 matrix. Reverse Traffic Channel repeated code symbols shall be output from the interleaver by rows. For Radio Configuration 1 and 2, the interleaver rows shall be output in the following order:

At 9600 or 14400 bps:

1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 32

At 4800 or 7200 bps:

1 3 2 4 5 7 6 8 9 11 10 12 13 15 14 16 17 19 18 20 21 23 22 24 25 27 26 28 29 31 30 32

At 2400 or 3600 bps:

3.1.3.1.6 Puncturing

3.1.3.1.6.1 Convolutional Code Symbol Puncturing

Table 3.1.3.1.6.1-1 includes the base code rate, puncturing ratio, and puncturing patterns that shall be used for different radio configurations. Within a puncturing pattern, a '0' means that the symbol shall be deleted, and '1' means that a symbol shall be passed. The most significant bit in the pattern corresponds to the first symbol in the symbol group corresponding to the length of the puncturing pattern. The puncture pattern shall be repeated for all remaining symbols in the frame.

Table 3.1.3.1.6.1-1. Punctured Codes Used with Convolutional Codes

Base Code Rate	Puncturing Ratio	Puncturing Pattern	Associated Radio Configurations
1/2	2 of 6	'110101'	2
1/2	1 of 5	'11110'	4
1/2	1 of 9	'111111110'	4
1/2	2 of 18	'111011111 111111110'	9
1/3	1 of 5	'11110'	7
1/3	1 of 9	'111111110'	7
1/4	4 of 12	'110110011011'	5
1/4	1 of 5	'11110'	3
1/4	1 of 9	'111111110'	3
1/6	1 of 5	'11110'	6
1/6	1 of 9	'111111110'	6

For example, the puncturing pattern for Radio Configuration 2 is '110101', meaning that the first, second, fourth, and sixth symbols are passed, while the third and the fifth symbols of each consecutive group of six symbols are removed.

3.1.3.1.6.2 Turbo Code Symbol Puncturing

Table 3.1.3.1.6.2-1 includes the base code rate, puncturing ratio, and puncturing patterns that shall be used for different radio configurations. Within a puncturing pattern, a '0' means that the symbol shall be deleted and a '1' means that a symbol shall be passed. The most significant bit in the pattern corresponds to the first symbol in the symbol group corresponding to the length of the puncturing pattern. The puncture pattern shall be repeated for all remaining symbols in the frame.

Table 3.1.3.1.6.2-1. Punctured Codes Used with Turbo Codes

Base Code Rate	Puncturing Ratio	Puncturing Pattern	Associated Radio Configurations
1/2	2 of 18	'111110101 111111111'	9
1/4	4 of 12	'110111011010'	5

3.1.3.1.6.3 Flexible and Variable Rate Puncturing

If variable-rate Forward Supplemental Channel operation, flexible data rates, or both are supported, puncturing after symbol repetition is calculated as described here. However, the puncturing in 3.1.3.1.6.1 and 3.1.3.1.6.2 is used for the frame formats listed in Table 3.1.3.10.2-1 for the Forward Dedicated Control Channel, Table 3.1.3.11.2-1 for the Forward Fundamental Channel, or Tables 3.1.3.12.2-1, 3.1.3.12.2-2, or 3.1.3.12.2-3 for the Forward Supplemental Channel.

If the number of specified encoded symbols per frame at the encoder output is larger than the desired channel interleaver size ~~Forward Fundamental Channel or the Forward Dedicated Control Channel is supporting flexible data rates with Radio Configuration 5 and from 193 to 288 encoder input bits per frame~~, the following puncturing shall be applied. ~~Let L be the number of encoder output symbols and let D equal $\lfloor L/(L - 768) \rfloor$. Then, the puncturing deletes every D-th encoder output symbol until L – 768 symbols have been deleted. That is, if the unpunctured symbols are numbered from 1 to L, then symbols numbered D, 2D, 3D,..., (L – 768)D are deleted.~~

The k-th output symbol from the puncturing block shall be the $\lfloor kL/N \rfloor$-th input symbol, where k = 0 to N-1,

L = Number of specified encoded symbols per frame at encoder output, and

N = Desired channel interleaver size (N<L).

Otherwise, ~~if variable-rate Forward Supplemental Channel operation, flexible data rates, or both are supported,~~ puncturing after symbol repetition shall be disabled. ~~calculated as follows:~~

~~The number of repeated symbols punctured per frame puncturing is defined by~~

~~$P = LM - N$~~

~~where L = Number of specified encoded symbols per frame at encoder output~~

~~N = Desired channel interleaver size ($N \geq L$)~~

~~M = $\lceil N/L \rceil$ is the symbol repetition factor for flexible data rate~~

~~If P is equal to 0, then puncturing is not required. If puncturing is necessary, every D-th repeated symbol is deleted until the required number of punctured symbols per frame, P, is~~

~~achieved. That is, if the unpunctured symbols are numbered from 1 to LM, then symbols numbered D, 2D, 3D,... are deleted.~~

~~D = ⌊LM/P⌋ for P > 0; otherwise, puncturing is not required.~~

3.1.3.1.7 Block Interleaving

For the Sync Channel, the Paging Channels, the Broadcast Control Channels, the Common Assignment Channel, the Forward Common Control Channel, and the Forward Traffic Channels, all the symbols after symbol repetition and subsequent puncturing, if used, shall be block interleaved.

The interleaver parameters m and J are specified in Table 3.1.3.1.7-1. Figure 3.1.3.1.7-1 shows the configuration of the interleaver.

Table 3.1.3.1.7-1. Interleaver Parameters

Interleaver Size	m	J
48	4	3
96	5	3
192	6	3
384	6	6
768	6	12
1,536	6	24
3,072	6	48
6,144	7	48
12,288	7	96
144	4	9
288	5	9
576	5	18
1,152	6	18
2,304	6	36
4,608	7	36
9,216	7	72
18,432	8	72
36,864	8	144
128	7	1

TIA/EIA INTERIM STANDARD

Physical Layer Standard for cdma2000 Standards for Spread Spectrum Systems

TIA/EIA/IS-2000.2-A

(Revision of TIA/EIA/IS-2000.2)

MARCH 2000

TELECOMMUNICATIONS INDUSTRY ASSOCIATION

Representing the telecommunications industry in association with the Electronic Industries Alliance

Electronic Industries Alliance

Table 2.1.3.1.5-1. Code Symbol Repetition

Channel Type		Number of Repeated Code Symbols/Code Symbol
Access Channel (Spreading Rate 1 only)		2
Enhanced Access Channel		4 (9600 bps) 2 (19200 bps) 1 (38400 bps)
Reverse Common Control Channel		4 (9600 bps) 2 (19200 bps) 1 (38400 bps)
Reverse Dedicated Control Channel		2
Reverse Fundamental Channel	RC 1 or 2	8 (1200 or 1800 bps) 4 (2400 or 3600 bps) 2 (4800 or 7200 bps) 1 (9600 or 14400 bps)
	RC 3, 4, 5, or 6	16 (1500 or 1800 bps) 8 (2700 or 3600 bps) 4 (4800 or 7200 bps) 2 (9600 or 14400 bps)
Reverse Supplemental Code Channel (RC 1 or 2)		1
Reverse Supplemental Channel	20 ms frames	16 (1500 or 1800 bps) 8 (2700 or 3600 bps) 4 (4800 or 7200 bps) 2 (9600 or 14400 bps) 1 (> 14400 bps)
	40 ms frames	8 (1350 or 1800 bps) 4 (2400 or 3600 bps) 2 (4800 or 7200 bps) 1 (> 7200 bps)
	80 ms frames	4 (1200 or 1800 bps) 2 (2400 or 3600 bps) 1 (> 3600 bps)

2.1.3.1.6 Puncturing

2.1.3.1.6.1 Convolutional Code Symbol Puncturing

Table 2.1.3.1.6.1-1 includes the base code rate, puncturing ratio, and puncturing patterns that shall be used for different radio configurations. Within a puncturing pattern, a '0' means that the symbol shall be deleted and '1' means that a symbol shall be passed. The most significant bit in the pattern corresponds to the first symbol in the symbol group

corresponding to the length of the puncturing pattern. The puncture pattern shall be repeated for all remaining symbols in the frame.

Table 2.1.3.1.6.1-1. Punctured Codes Used with Convolutional Codes

Base Code Rate	Puncturing Ratio	Puncturing Pattern	Associated Radio Configurations
1/4	8 of 24	'111010111011 101011101010'	4 and 6
1/4	4 of 12	'110110011011'	4
1/4	1 of 5	'11110'	3 and 5
1/4	1 of 9	'111111110'	3 and 5
1/2	2 of 18	'111011111 111111110'	6

For example, the 5-symbol puncturing pattern for Radio Configuration 3 is '11110', meaning that the first, second, third, and fourth symbols are passed, while the fifth symbol of each consecutive group of five symbols is removed.

2.1.3.1.6.2 Turbo Code Symbol Puncturing

Table 2.1.3.1.6.2-1 includes the base code rate, puncturing ratio, and puncturing patterns that shall be used for different radio configurations. Within a puncturing pattern, a '0' means that the symbol shall be deleted and a '1' means that a symbol shall be passed. The most significant bit in the pattern corresponds to the first symbol in the symbol group corresponding to the length of the puncturing pattern. The puncture pattern shall be repeated for all remaining symbols in the frame.

Table 2.1.3.1.6.2-1. Punctured Codes Used with Turbo Codes

Base Code Rate	Puncturing Ratio	Puncturing Pattern	Associated Radio Configurations
1/2	2 of 18	'111110101 111111111'	6
1/4	4 of 12	'110111011010'	4

2.1.3.1.6.3 Flexible and Variable Rate Puncturing

If variable-rate Reverse Supplemental Channel operation, flexible data rates, or both are supported, puncturing after symbol repetition is calculated as described here. However, note that the puncturing in 2.1.3.1.6.1 and 2.1.3.1.6.2 is used for the frame formats listed

in Table 2.1.3.6.2-1 for the Reverse Dedicated Control Channel, Table 2.1.3.7.2-1 for the Reverse Fundamental Channel, or Tables 2.1.3.8.2-1, 2.1.3.8.2-2, or 2.1.3.8.2-3 for the Reverse Supplemental Channel. The number of symbols punctured per frame puncturing is defined by

$$P = LM - N$$

where L = Number of specified encoded symbols per frame at the encoder output

N = Desired channel interleaver size ($N \geq L$)

M = $\lceil N/L \rceil$ is the symbol repetition factor

If P is equal to 0, then puncturing is not required. If puncturing is necessary, every D-th repeated symbol is deleted until the required number of punctured symbols per frame, P, is achieved. That is, if the unpunctured symbols are numbered from 1 to LM, then symbols numbered D, 2D, 3D,... are deleted.

$$D = \lfloor LM/P \rfloor \text{ for } P > 0; \text{ otherwise, puncturing is not required}$$

2.1.3.1.7 Block Interleaving

The mobile station shall interleave all repeated code symbols and subsequent puncturing, if used, on the Access Channel, the Enhanced Access Channel, the Reverse Common Control Channel, and the Reverse Traffic Channel prior to modulation and transmission.

For the Reverse Traffic Channel with Radio Configurations 1 and 2, the interleaver shall be an array with 32 rows and 18 columns (i.e., 576 cells). Repeated code symbols shall be written into the interleaver by columns from the first column to the eighteenth column filling the complete 32 × 18 matrix. Reverse Traffic Channel repeated code symbols shall be output from the interleaver by rows. For Radio Configuration 1 and 2, the interleaver rows shall be output in the following order:

At 9600 or 14400 bps:

1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 32

At 4800 or 7200 bps:

1 3 2 4 5 7 6 8 9 11 10 12 13 15 14 16 17 19 18 20 21 23 22 24 25 27 26 28 29 31 30 32

At 2400 or 3600 bps:

1 5 2 6 3 7 4 8 9 13 10 14 11 15 12 16 17 21 18 22 19 23 20 24 25 29 26 30 27 31 28 32

At 1200 or 1800 bps:

1 9 2 10 3 11 4 12 5 13 6 14 7 15 8 16 17 25 18 26 19 27 20 28 21 29 22 30 23 31 24 32

For the Access Channel, the Enhanced Access Channel, the Reverse Common Control Channel, and the Reverse Traffic Channel with Radio Configurations 3, 4, 5, and 6, the symbols input to the interleaver are written sequentially at addresses 0 to the block size (N) minus one. The interleaved symbols are read out in a permuted order with the i-th symbol being read from address A_i, as follows:

3.1.3.1.6 Puncturing

3.1.3.1.6.1 Convolutional Code Symbol Puncturing

Table 3.1.3.1.6.1-1 includes the base code rate, puncturing ratio, and puncturing patterns that shall be used for different radio configurations. Within a puncturing pattern, a '0' means that the symbol shall be deleted, and '1' means that a symbol shall be passed. The most significant bit in the pattern corresponds to the first symbol in the symbol group corresponding to the length of the puncturing pattern. The puncture pattern shall be repeated for all remaining symbols in the frame.

Table 3.1.3.1.6.1-1. Punctured Codes Used with Convolutional Codes

Base Code Rate	Puncturing Ratio	Puncturing Pattern	Associated Radio Configurations
1/2	2 of 6	'110101'	2
1/2	1 of 5	'11110'	4
1/2	1 of 9	'111111110'	4
1/2	2 of 18	'111011111 111111110'	9
1/3	1 of 5	'11110'	7
1/3	1 of 9	'111111110'	7
1/4	4 of 12	'110110011011'	5
1/4	1 of 5	'11110'	3
1/4	1 of 9	'111111110'	3
1/6	1 of 5	'11110'	6
1/6	1 of 9	'111111110'	6

For example, the puncturing pattern for Radio Configuration 2 is '110101', meaning that the first, second, fourth, and sixth symbols are passed, while the third and the fifth symbols of each consecutive group of six symbols are removed.

3.1.3.1.6.2 Turbo Code Symbol Puncturing

Table 3.1.3.1.6.2-1 includes the base code rate, puncturing ratio, and puncturing patterns that shall be used for different radio configurations. Within a puncturing pattern, a '0' means that the symbol shall be deleted and a '1' means that a symbol shall be passed. The most significant bit in the pattern corresponds to the first symbol in the symbol group corresponding to the length of the puncturing pattern. The puncture pattern shall be repeated for all remaining symbols in the frame.

Table 3.1.3.1.6.2-1. Punctured Codes Used with Turbo Codes

Base Code Rate	Puncturing Ratio	Puncturing Pattern	Associated Radio Configurations
1/2	2 of 18	'111110101 111111111'	9
1/4	4 of 12	'110111011010'	5

3.1.3.1.6.3 Flexible and Variable-Rate Puncturing

If variable-rate Forward Supplemental Channel operation, flexible data rates, or both are supported, puncturing after symbol repetition is calculated as described here. However, the puncturing in 3.1.3.1.6.1 and 3.1.3.1.6.2 is used for the frame formats listed in Table 3.1.3.10.2-1 for the Forward Dedicated Control Channel, Table 3.1.3.11.2-1 for the Forward Fundamental Channel, or Tables 3.1.3.12.2-1, 3.1.3.12.2-2, or 3.1.3.12.2-3 for the Forward Supplemental Channel.

If the Forward Fundamental Channel or the Forward Dedicated Control Channel is supporting flexible data rates with Radio Configuration 5 and from 193 to 288 encoder input bits per frame, the following puncturing shall be applied. Let L be the number of encoder output symbols and let D equal $\lfloor L/(L - 768) \rfloor$. Then, the puncturing deletes every D-th encoder output symbol until L – 768 symbols have been deleted. That is, if the unpunctured symbols are numbered from 1 to L, then symbols numbered D, 2D, 3D,..., (L – 768)D are deleted.

Otherwise, if variable-rate Forward Supplemental Channel operation, flexible data rates, or both are supported, puncturing after symbol repetition shall be calculated as follows:

The number of repeated symbols punctured per frame puncturing is defined by

$$P = LM - N$$

where L = Number of specified encoded symbols per frame at encoder output

N = Desired channel interleaver size ($N \geq L$)

$M = \lceil N/L \rceil$ is the symbol repetition factor for flexible data rate

If P is equal to 0, then puncturing is not required. If puncturing is necessary, every D-th repeated symbol is deleted until the required number of punctured symbols per frame, P, is achieved. That is, if the unpunctured symbols are numbered from 1 to LM, then symbols numbered D, 2D, 3D,... are deleted.

$D = \lfloor LM/P \rfloor$ for $P > 0$; otherwise, puncturing is not required.

3.1.3.1.7 Block Interleaving

For the Sync Channel, the Paging Channels, the Broadcast Control Channels, the Common Assignment Channel, the Forward Common Control Channel, and the Forward Traffic